

# Feasibility Study Document

## For: *MediConnect – Hospital Management System*

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University of Rajshahi

Course: Software Engineering (CSE-3112)

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## 1. Introduction

### 1.1 Purpose

The purpose of this feasibility study is to evaluate the viability of developing and deploying the **MediConnect Hospital Management System (HMS)** — a web-based platform that connects patients, doctors, and hospitals in a unified digital ecosystem. The study examines the **technical, economic, operational, legal, and schedule** feasibilities to determine whether the system is practical and sustainable for large-scale implementation.

### 1.2 Scope

MediConnect aims to modernize healthcare services in Bangladesh by providing a centralized system for:

- Hospital discovery and comparison
- Doctor profile management and appointment booking
- Real-time ICU bed availability
- Schedule and off-day management for doctors
- Hospital administration dashboards for resource tracking

The system targets hospitals, patients, and doctors across all six major divisions of Bangladesh — **Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, and Rangpur** — providing a scalable, secure, and responsive web application.

### 1.3 Objective

To assess whether MediConnect can be implemented efficiently using the chosen technology stack (React + Node.js + SQLite + Drizzle ORM) within academic and professional constraints while ensuring usability, performance, and data integrity.

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## 2. Overview of the Proposed System

### 2.1 System Description

MediConnect is a **full-stack web application** offering:

- **Frontend:** React 18.3.1 + TypeScript, Tailwind CSS, shadcn/ui
- **Backend:** Node.js + Express + TypeScript + SQLite + Drizzle ORM
- **Authentication:** Passport.js + Express Session
- **Data Management:** Real-time ICU bed tracking, dynamic doctor/department statistics
- **Security:** Password hashing, role-based access control, SQL injection prevention

### 2.2 Key Features

#### For Patients

- Search hospitals by location and specialization
- View doctor profiles and book appointments with auto-generated serials
- Check real-time ICU bed availability
- Filter hospitals by district and department

#### For Doctors

- Manage schedules and off-days
- Track and update appointments
- Mark appointments as completed or canceled

#### **For Hospital Administrators**

- Update ICU bed counts dynamically
  - Manage departments and doctors
  - Monitor hospital-level statistics
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## **3. Feasibility Analysis**

### **3.1 Technical Feasibility**

#### **3.1.1 Hardware and Software Requirements**

- **Server:** Node.js environment (v18+), 4GB RAM, SQLite database
- **Client:** Browser-based interface (Chrome, Firefox, Edge)
- **Development Tools:** Vite, ESLint, PostCSS, Drizzle Kit

#### **3.1.2 Technology Justification**

- **React + TypeScript:** Ensures maintainable, scalable frontend with type safety
- **Drizzle ORM + SQLite:** Provides a lightweight, type-safe, embedded database ideal for academic deployment
- **Passport.js:** Offers secure, session-based authentication
- **Tailwind CSS + shadcn/ui:** Enables modern, responsive UI with minimal code complexity

#### **3.1.3 Integration Feasibility**

The RESTful API design (e.g., [/api/hospitals](#), [/api/appointments](#)) allows smooth communication between frontend and backend.

Real-time updates (ICU availability, serial generation) are handled efficiently through database triggers and re-fetching via TanStack Query.

**Conclusion:**

The system is **technically feasible**, given modern web technologies, open-source tools, and moderate hosting requirements.

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## 3.2 Economic Feasibility

### 3.2.1 Cost Estimation

Category	Cost (BDT)	Description
Development Tools	0	Open-source stack (React, Node.js, SQLite)
Hosting	~3,000/year	Shared or VPS hosting
Maintenance	~2,000/year	Database backup, updates
Human Resource	Academic	Developed by university students
Total Estimated Cost	~5,000 BDT	Affordable academic prototype

### 3.2.2 Benefit Analysis

Benefit	Impact
Reduced manual scheduling	High
Increased patient convenience	High
Improved hospital transparency	High
Real-time data synchronization	Medium
Scalable for future telemedicine features	High

**Conclusion:**

Economically, the system is **cost-effective**, leveraging open-source technologies and minimal infrastructure for deployment.

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## 3.3 Operational Feasibility

### 3.3.1 User Acceptability

- **Patients:** Benefit from simplified hospital discovery and appointment booking
- **Doctors:** Gain control over schedule and patient load
- **Admins:** Obtain centralized dashboards and ICU monitoring tools

### 3.3.2 Ease of Use

- Simple, intuitive interface with responsive design
- Confirmation dialogs prevent accidental actions
- Dynamic toast notifications enhance user feedback

### 3.3.3 Maintenance

- Database schema managed through **Drizzle Kit Migrations**
- Easily extendable for new modules like payment gateways and prescriptions

### Conclusion:

The system is **operationally feasible**, requiring minimal training and maintenance effort.

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## 3.4 Legal and Ethical Feasibility

### 3.4.1 Data Security and Privacy

- User passwords are stored securely using bcrypt hashing
- Session-based authentication with role-based access control
- Data validation to prevent injection and misuse

### 3.4.2 Compliance

The project complies with the **Bangladesh ICT Act 2006** and follows ethical software handling for sensitive medical information.

**Conclusion:**

The system is **legally and ethically compliant** for prototype and potential institutional deployment.

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**3.5 Schedule Feasibility**

**3.5.1 Development Timeline**

Phase	Duration	Description
Requirement Analysis	2 Weeks	Functional + non-functional requirements
System Design	3 Weeks	ER Diagram, UML, Architecture
Implementation	6 Weeks	React frontend + Node.js backend
Testing & Debugging	3 Weeks	Unit + Integration testing
Deployment & Demo	2 Weeks	Hosting and presentation

**Total Duration:** *~16 weeks (4 months)*

**Conclusion:**

With disciplined project management and version control (GitHub), the system can be completed **within one semester**.

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**4. Risk Assessment**

Risk	Likelihood	Impact	Mitigation
Data inconsistency	Medium	High	Validation on both frontend & backend
Server downtime	Low	Medium	Use of SQLite with auto-reconnect
Security breach	Low	High	Role-based access + password hashing
Schedule delay	Medium	Medium	Weekly review and milestone tracking

**Risk Level:** *Moderate – manageable through proactive planning.*

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## 5. Feasibility Summary

Aspect	Feasibility Status	Justification
Technical	 Feasible	Modern, lightweight, scalable technologies
Economic	 Feasible	Low-cost, open-source stack
Operational	 Feasible	Easy-to-use interfaces
Legal	 Feasible	Complies with ethical data handling
Schedule	 Feasible	Achievable within an academic semester

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## 6. Conclusion

After a detailed evaluation, the **MediConnect Hospital Management System** is found to be **feasible and sustainable** across all aspects.

The project effectively integrates **technical innovation**, **cost efficiency**, and **usability** to deliver a **smart, secure, and scalable healthcare management solution** tailored for the **Bangladeshi context**.

**Final Verdict:**

The MediConnect HMS is fully feasible for academic implementation and has high potential for real-world adaptation.